AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions and listings of claims in the application:

Claims 1-34 (Canceled).

35. (Withdrawn) A method for inducing apoptosis in a eukaryotic cell comprising targeting a cell with a chimeric, bifunctional molecule as claimed in claim 46.

Claims 36-45 (Canceled).

46. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule binds and enters the cell and has the formula:

Targ-(MLS)-Tox,

wherein Tox consists of a peptide chosen from Table I and Targ consists of a peptide chosen from Table III,

wherein MLS is a mitochondrial localization sequence, and

wherein the Targ and Tox peptides are covalently bonded through a peptide linker comprising 3 to 18 amino acids, the peptide linker having a cleavage site that is not present in the Targ and Tox peptides.

Claims 47-58 (Canceled).

59. (Withdrawn) A method of determining the presence of a cancer cell having a tumor-associated surface antigen in a biological sample of interest comprising:

(A) contacting the biological sample with a chimeric, bifunctional molecule as claimed in claim 46 under conditions permitting binding between the chimeric, bifunctional molecule and the antigen on the surface of the cancer cell;

(B) detecting the binding; and,

(C) optionally, quantifying the binding detected in step (B).

60. (Withdrawn) A method for inducing death by apoptosis in a tumor cell or viral infected cell in a biological sample of interest, wherein the tumor cell or viral infected cell has a tumor-associated antigen on the surface, the method comprising:

(A) contacting the biological sample of interest with a chimeric, bifunctional molecule as claimed in claim 46 under conditions permitting the binding between the chimeric, bifunctional molecule and the antigen on the surface of the cancer cell; and,

(B) incubating for a time sufficient to allow entry of the chimeric, bifunctional molecule into the cell and induce cell death by apoptosis.

Claims 61-63 (Canceled).

64. (Withdrawn) A method for identifying an agent that interacts with a PTPC comprising:

(A) contacting a biological sample containing cells with the PTPC with a chimeric, bifunctional molecule as claimed in claim 46 in the presence of a candidate agent;

(B) comparing the binding of the chimeric peptide to the PTPC in absence of the candidate agent; and,

(C) optionally, testing the activity of the selected agent on a preparation of a cellular extract comprising subcellular elements of the PTPC.

65. (Withdrawn) A method for identifying an active agent of interest that interacts with ANT peptide of PTPC comprising:

(A) contacting a biological sample containing cells with ANT peptide of PTPC with a chimeric, bifunctional molecule as claimed in claim 46 in the presence of a candidate agent; and

(B) comparing the binding of the chimeric peptide with the ANT peptide of the PTPC in absence of the agent,

(C) optionally, testing the activity of the selected agent on a preparation of a cellular extract comprising subcellular elements with the ANT peptide of the PTPC.

66. (Withdrawn) A method of identifying a mitochondrial antigen, comprising interacting the antigen with a macromolecule, molecule, or peptide comprising Tox as claimed in claim 46.

Claim 67 (Canceled).

68. (Withdrawn) A method of treatment or of prevention of a pathological infection or disease comprising administering to a patient a pharmaceutical composition comprising a chimeric, bifunctional molecule as claimed in claim 46.

69. (Previously Presented) A pharmaceutical composition comprising a chimeric, bifunctional molecule as claimed in claim 46.

70. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule has the formula:

TARG-(MLS)-TOX,

wherein:

TOX consists of a Bax, Bid, or Bad peptide of the proapoptotic Bcl-2 family, which interacts with the PTPC, ~~and~~

TARG consists of RQIKITFQNRRMKTKK (SEQ ID NO: 267), HIV-1 Vpr 83-96 transduction domain (SEQ ID NO: 268), HIV-1 tat 48-59 transduction domain (SEQ ID NO: 269), HIV-1 tat 49-57 (SEQ ID NO: 270), or pep-1 (SEQ ID NO: 271),

MLS is a mitochondrial localization sequence,

and wherein the TARG peptide is covalently linked to the TOX peptide by a peptide linker of 2-18 amino acids, the peptide linker having a cleavage site that is not present in the TARG and TOX peptides.

71. (Previously Presented) The chimeric, bifunctional molecule as claimed in claim 70, wherein TARG consists of D-amino acids and a C-terminal amide function.

72. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional

molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule has the formula:

TARG-(MLS)-TOX,

wherein:

TOX is a peptide consisting of Bid 84-100 (SEQ ID NO: 238), Bax 57-72 (SEQ ID NO: 239), Bax 72-87 (SEQ ID NO: 240), Bad 103-127 (SEQ ID NO: 258), or Bax 52-76 (SEQ ID NO: 259), ~~and~~

TARG consists of RQIKITFQNRRMKTKK (SEQ ID NO: 267), HIV-1 Vpr 83-96 transduction domain (SEQ ID NO: 268), HIV-1 tat 48-59 transduction domain (SEQ ID NO: 269), HIV-1 tat 49-57 (SEQ ID NO: 270), or pep-1 (SEQ ID NO 271),

MLS is a mitochondrial localization sequence,

and wherein the TARG peptide is covalently linked to the TOX peptide by a peptide linker of 2-18 amino acids, the peptide linker having a cleavage site that is not present in the TARG and TOX peptides.

73. (Previously Presented) The chimeric, bifunctional molecule as claimed in claim 72, wherein TARG consists of D-amino acids and a C-terminal amide function.

74. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by

regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule has the formula:

TARG-(MLS)-TOX,

wherein

TOX consists of the peptide BAX 57-72 (SEQ ID NO: 239), and

TARG consists of HIV tat 48-59 peptide (SEQ ID NO: 269),

MLS is a mitochondrial localization sequence,

and wherein the TARG peptide is covalently linked to the TOX peptide by a peptide linker of 2-18 amino acids, the peptide linker having a cleavage site that is not present in the TARG and TOX peptides.

75. (Previously Presented) The chimeric, bifunctional molecule as claimed in claim 74, wherein TARG consists of D-amino acids and a C-terminal amide function.

76. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule has the formula:

TARG-(MLS)-TOX,

wherein

TOX consists of a Bax, Bid, or Bad peptide of the proapoptotic Bcl-2 family, which interacts with the PTPC, and

TARG consists of RQIKITFQNRRMKTKK (SEQ ID NO: 267), HIV-1 Vpr 83-96 transduction domain (SEQ ID NO: 268), HIV-1 tat 48-59 transduction domain (SEQ ID NO: 269), HIV-1 tat 49-57 (SEQ ID NO: 270), or pep-1 (SEQ ID NO 271), which comprises D-amino acids and a C-terminal amide function,

MLS is a mitochondrial localization sequence,

and wherein the TARG peptide is covalently linked to the TOX peptide by a peptide linker of 2-18 amino acids, the peptide linker having a cleavage site that is not present in the TARG and TOX peptides.

77. (Previously Presented) The chimeric, bifunctional molecule as claimed in claim 76, wherein TARG consists of D-amino acids and a C-terminal amide function and is covalently linked to TOX by the peptide linker.

78. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule has the formula:

TARG-(MLS)-TOX,

wherein:

TOX consists of Bid 94-100 (SEQ ID NO: 238), Bax 57-72 (SEQ ID NO: 239), Bax 72-87 (SEQ ID NO: 240), Bad 103-127 (SEQ ID NO: 258), or Bax 52-76 (SEQ ID NO: 259), ~~and~~

TARG consists of RQIKITFQNRRMKTKK (SEQ ID NO: 267), HIV-1 Vpr 83-96 transduction domain (SEQ ID NO: 268), HIV-1 tat 48-59 transduction domain (SEQ ID NO: 269), HIV-1 tat 49-57 (SEQ ID NO: 270), or pep-1 (SEQ ID NO 271), which comprises D-amino acids and a C-terminal amide function,

MLS is a mitochondrial localization sequence,

and wherein the TARG peptide is covalently linked to the TOX peptide by a peptide linker of 2-18 amino acids, the peptide linker having a cleavage site that is not present in the TARG and TOX peptides.

79. (Previously Presented) The chimeric, bifunctional molecule as claimed in claim 78, wherein TARG consists of D-amino acids and a C-terminal amide function and is covalently linked to TOX by the peptide linker.

80. (Currently Amended) A chimeric, bifunctional molecule that can enter into a cell to induce death of the cell by apoptosis, wherein the chimeric, bifunctional molecule comprises a first functional molecule covalently linked to a second functional molecule, wherein the first functional molecule targets and enters into the cell and the second functional molecule targets and induces the death of the cell by apoptosis by regulating opening of a permeability transition pore complex (PTPC) of mitochondria or a fragment of the PTPC, wherein the chimeric, bifunctional molecule has the formula:

TARG-(MLS)-TOX,

wherein

TOX consists of the peptide BAX 57-72 (SEQ ID NO; 239), ~~and~~

TARG consists of HIV tat 49-59 peptide (SEQ ID NO: 269), which comprises D-amino acids and a C-terminal amide function,

MLS is a mitochondrial localization sequence,

and wherein the TARG peptide is covalently linked to the TOX peptide by a peptide linker of 2-18 amino acids, the peptide linker having a cleavage site that is not present in the TARG and TOX peptides.

81. (Previously Presented) The chimeric, bifunctional molecule as claimed in claim 80, wherein TARG consists of D-amino acids and a C-terminal amide function and is covalently linked to TOX by the peptide linker.

82. (Previously Presented) A pharmaceutical composition comprising a chimeric, bifunctional molecule as claimed in claim 70 in combination with a physiologically acceptable diluent, carrier, or excipient.

83. (Previously Presented) A pharmaceutical composition comprising a chimeric, bifunctional molecule as claimed in claim 72 in combination with a physiologically acceptable diluent, carrier, or excipient.

84. (Previously Presented) A pharmaceutical composition comprising a chimeric, bifunctional molecule as claimed in claim 74 in combination with a physiologically acceptable diluent, carrier, or excipient.

85. (Withdrawn) A method for inducing death by apoptosis in a cell, wherein the method comprises:

(A) contacting the cell with a chimeric, bifunctional molecule as claimed in claim 70 under conditions permitting the binding between the chimeric, bifunctional molecule and the surface of the cell; and,

(B) incubating for a time sufficient to allow entry of the chimeric, bifunctional molecule into the cell and induce cell death by apoptosis.

86. (Withdrawn) A method for inducing death by apoptosis in a cell, wherein the method comprises:

(A) contacting the cell with a chimeric, bifunctional molecule as claimed in claim 72 under conditions permitting the binding between the chimeric, bifunctional molecule and the surface of the cell; and,

(B) incubating for a time sufficient to allow entry of the chimeric, bifunctional molecule into the cell and induce cell death by apoptosis.

87. (Previously Presented) A method for inducing death by apoptosis in a cell, wherein the method comprises:

(A) contacting the cell with a chimeric, bifunctional molecule as claimed in claim 74 under conditions permitting the binding between the chimeric, bifunctional molecule and the surface of the cell; and,

(B) incubating for a time sufficient to allow entry of the chimeric, bifunctional molecule into the cell and induce cell death by apoptosis.

88. (Withdrawn) A method of determining the presence of a cancer cell having a tumor-associated surface antigen in a biological sample of interest comprising:

(A) contacting the biological sample with a chimeric, bifunctional molecule as claimed in claim 70 under conditions permitting binding between the chimeric, bifunctional molecule and the antigen on the surface of the cancer cell;

(B) detecting the binding; and,

(C) optionally, quantifying the binding detected in step (B).

89. (Withdrawn) A method of determining the presence of a cancer cell having a tumor-associated surface antigen in a biological sample of interest comprising:

(A) contacting the biological sample with a chimeric, bifunctional molecule as claimed in claim 72 under conditions permitting binding between the chimeric, bifunctional molecule and the antigen on the surface of the cancer cell;

(B) detecting the binding; and,

(C) optionally, quantifying the binding detected in step (B).

90. (Withdrawn) A method of determining the presence of a cancer cell having a tumor-associated surface antigen in a biological sample of interest comprising:

(A) contacting the biological sample with a chimeric, bifunctional molecule as claimed in claim 74 under conditions permitting binding between the chimeric, bifunctional molecule and the antigen on the surface of the cancer cell;

(B) detecting the binding; and

(C) optionally, quantifying the binding detected in step (B).